

The Ross Sea region Marine Protected Area Research and Monitoring Plan

Introduction

1. The Ross Sea region Marine Protected Area (MPA) is the world's largest marine protected area. Jointly proposed and designed by New Zealand and the United States, it was agreed by the Commission for the Conservation of Antarctic Living Resources (CCAMLR) in October 2016 and will come into force on 1 December 2017.
2. CCAMLR requires scientific assessment to determine if the objectives of the MPA are being achieved, are still relevant in different areas of the Ross Sea region and if changes are required to achieve any of the objectives.
3. CCAMLR will review the scientific progress every 5 years; and will evaluate if the objectives are being met, are relevant, or could be improved, every 10 years.
4. The agreement for the MPA will be reviewed in full in 2052.

Objectives of the Ross Sea region Marine Protected Area

5. There are 11 objectives for the MPA, and these fall into three categories:
 - a. **Threat mitigation** - does the MPA protect the region from threats?
 - b. **Representativeness** - does the MPA protect an adequate proportion of the marine environments in the region?
 - c. **Scientific reference areas** - are there enough areas with little or no fishing so we can understand how intact marine ecosystems work?

The Research and Monitoring Plan

6. The MPA Research and Monitoring Plan provides a framework for the research into the effectiveness of the MPA.
7. The plan identifies research topics, and describes the process for CCAMLR Members to collaborate and report on research.
8. The plan encourages collaboration and close coordination between CCAMLR members conducting research in the Ross Sea region. It requires that the research that is undertaken is open and transparent, and the underlying research data is available to all members.
9. Baseline data and preliminary indicators have been developed for the MPA, and will be extended over time through the MPA review process (see para. 3 above).
10. Key areas requiring research to evaluate if the objectives of the MPA are being met are outlined in the Research and Monitoring Plan, and are summarised below.

Threat mitigation objectives

11. These objectives aim to prevent negative impacts on ecosystems as a result of fishing, in accordance with the requirements of the CAMLR convention (Article II).
12. To do this we need to understand key ecological relationships and distinguish between the effects of fishing and environmental factors over long timeframes (decades). The Research and Monitoring Plan has a particular focus on:
 - a. Continental shelf: Top predators potentially interacting with toothfish; Ecological roles of silverfish; Antarctic toothfish life cycle and movement.
 - b. Continental slope: Effects of fishing on associated fish species; ecological role of krill; Antarctic toothfish life cycle and movement.
 - c. Northern seamounts and hills: Effects of fishing on associated fish species; ecological role of krill; Antarctic toothfish life cycle and movement.

Representativeness objectives

13. These objectives aim to ensure the MPA protects an adequate proportion of the marine environments in the region.
14. The Research and Monitoring Plan indicates that the focus of work to meet these objectives should be in areas where baseline information is lacking, in particular the regions where benthic (seafloor) habitats are poorly described (e.g., the northern seamounts and hills).
15. The representativeness objectives are a lower priority in those areas where threat-based objectives (above) already guarantee a higher level of protection (e.g., continental shelf, western Ross Sea).

Scientific reference area objectives

16. The goal is to promote research relevant to the MPA by:
 - a. Establishing 'scientific reference areas' to examine unfished marine ecosystems and to compare the effects of different levels of fishing in different habitats;
 - b. Investigating krill and toothfish life cycles, both inside and outside the MPA.

Research priorities for New Zealand

17. Based on the Research and Monitoring plan, and our areas of expertise, New Zealand will prioritise research within five themes: top predators, fish assemblages & food webs, benthos, fisheries, and physical environment.

Top predators

18. Research on top predators should be used to develop key indicators of ecosystem change. This program of work would include:

- a. Abundance, distribution, diet, and reproductive performance of marine mammals, toothfish, seabirds and their prey.
- b. Identifying what to monitor, how, and for how long (which will require methods development).
- c. Understanding predator distribution and how this changes over time (both within and between years) and if and how this variation affects ecosystem dynamics.

Fish assemblages and food webs

19. Research to better understand the fish communities and food webs associated with toothfish, specifically:
 - a. Historic, current, and future changes to productivity (how well the fish stock replenishes) in the region?
 - b. What are the ecosystem effects of fishing on toothfish prey (e.g., bottom fish communities), and is there any evidence that fishing may have secondary effects on the prey or competitors of toothfish (e.g., silverfish, Adélie penguins)?
 - c. Are there likely to be changes to the distributions of species (e.g., as a result of climate change)?

Benthos (sea floor)

20. Research is required to improve understanding of the ecological roles of benthic species, particularly seafloor invertebrates, and the effects of fishing on those organisms.

Fisheries

21. Research into the biology of harvested species and the impacts of fishing within and outside the MPA boundaries:
 - a. Improved understanding of toothfish biology, stock structure, and growth rates/patterns.
 - b. The importance of Balleny Islands or other areas as nurseries for toothfish and silverfish; migration, reproduction and early life history of toothfish.
 - c. Trends in bycatch abundance; biology, ecology, abundance of krill.

Physical environment

22. The overall oceanography of the Ross Sea has been reasonably well described, but the drivers of potentially important processes are not fully understood. Understanding these drivers will help determine the cause of any changes - are they climate related, caused by humans, or naturally occurring? This research includes:
 - a. Monitoring of ocean productivity.
 - b. Sea ice dynamics.

- c. Development of ocean models of the physical oceanography, ocean biochemistry, bottom water formation, and transport of nutrients.